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siderable thickness are found, on examination, to be made up almost entirely of their silicious skeletons. Thus in the chalks and marls of Sicily and Greece, Ehrenberg detected vast numbers of forms; and at Oran, in the north of Africa, is an extensive stratum made up of the remains of Polycistineæ and similar organisms, both animal and vegetable. The famous infusorial strata of the States of Virginia and Maryland on our Atlantic coast, and of California on the Pacific, have, mixed with the minute plants known as Diatomaceæ, many very fine species of Polycistineæ, as well as the remains of sponges. The most remarkable deposit, however, of this character is that which makes up the greater part of the island of Barbadoes. This rock is, in many places, almost entirely formed of these glassy shells. The materials which led to this discovery, in the year 1846, were furnished by the geological researches of Sir. R. H. Schomburgh, hence one of the most beautiful species has been named after him.

The variety of form and outline which the Polycistineæ assume is very great, and always of great beauty and grace, while their minute dimensions make them, if possible, still greater sources of admiration to the student of nature who thus finding strata of rocks, of considerable thickness, made up of their delicate remains feels the truth of the words of the poet, when he says—

> "The dust we walk upon was once alive."

REVIEWS.

THE METAMORPHOSIS OF CRABS.*—That insects undergo a metamorphosis was known by the ancients; the discovery that crabs and worms undergo a true metamorphosis, scarcely less striking than that of insects, is not more than thirty years old. The Nauplius form, here figured, was known to naturalists in the days of O. F. Müller (who wrote a work on Crustacea in 1785) and was known to be the young of the little Cyclops and Cypris, which swim in fresh water and tidal pools; and the strange Zoëa was made known in 1802 by Bosc, who described it as an Entomostracan under the name of *Zoe pelagica.* That, however, the Zoëa was simply a young crab was shown by J. V. Thompson, in 1836, and that the earliest stage of the shrimp began with a Nauplius form is a still more recent discovery, and so remarkable in its bearings on the classification of the Crustacea, and the philosophic study of the Crustacea generally, that an explanation of how crabs and shrimps grow may be welcome to our readers. For a summary of the facts here presented we are especially indebted to Fritz Müller's "*Für Darwin,*" a book called forth by Darwin's Origin of Species, and written by a strong and able advocate of developmental views, and which has just been translated into English by Mr. Dallas. We have often watched the Nauplius of the water fleas, Cyclops, etc., swimming about in a small fresh water aquarium, when they closely resemble young mites. Indeed the spiders (Arachnida) seem in the young of their degraded forms to mimic wonderfully the young of the Crustacea, so that the two forms would seem at a casual glance, hardly to belong to different genera, and it is a most significant fact that these two great groups seem to run into each other here, so that their limits seem indistinguishable, and we only know that one is a young spider and the other a young shrimp by tracing their life history farther on. Again, the border land of the Crustacean world and the spider world fade insensibly into each other when we have before us a Pycnogonid or Sea-spider, and a Harvest-man for example, and it is only by going up the scale, and by intermediate forms tracing the relationship of the one to the crabs, and of the other to the true spiders, that we realize that the two worlds seem to touch

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*Fur Darwin. Von Fritz Muller. With sixty-seven woodcuts. Leipzig, 1864. 8vo, pp. 91. Also recently translated and published in London by Van Voorst.

Fig. 72.

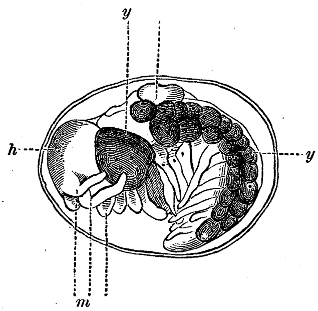
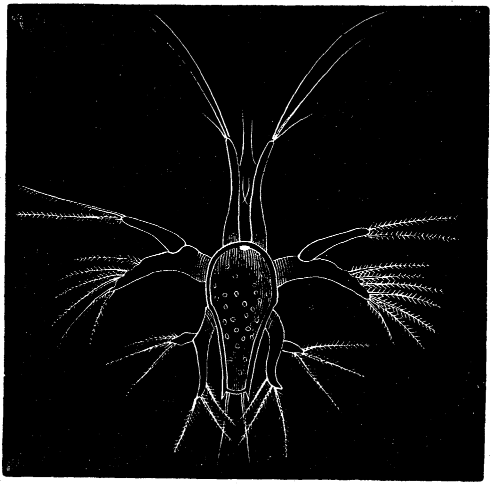


Fig. 73.



at only a single spot, and that even then the contact is not real. In fact the Nauplius is a larva, and as the insect world seems to touch upon the worm world when a caterpillar or dipterous larva is before us, so the larva of the mite and the larva of the crab assume a common form, though potentially so divergent. It is only a partial view that would unite the Arachnids with the Crustacea because of the identity in form of their larval stages, or of certain degraded forms. Among insects we do not know the Stylops alone by the Sac-like female scarcely more highly organized, so far as externals go, than the Peltogaster, but consider also the active, highly organized, male Stylops, a being so widely divergent in external form from its mate, and though the difference is only sexual in its nature, yet reaching almost as far as the difference between classes in the animal kingdom.

Fig. 74.

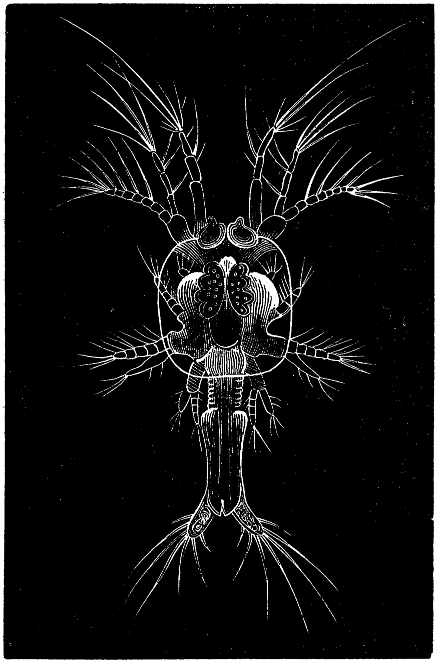
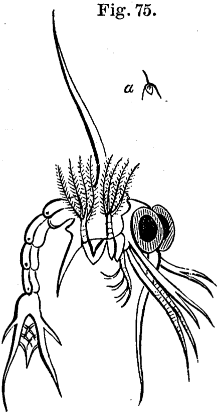


Fig. 72 represents an embryo of a Corophium, magnified ninety diameters; the mouth-parts are similar to the legs in form. The yolk mass (*y*) lies on the back of the animal; *h* is the head, and *m* the mouth-parts.

Fig. 73 represents the larva, or "Nauplius," of a shrimp, magnified forty-five diameters. The body is soft, oval, in form somewhat like a mite, and with three pairs of short thick legs, of which the front pair are simple, ending in long simple bristles, while the two hinder pairs are divided into two portions, each bearing two or more spinulated bristles; and the end of the body is square, with two bristles.

Fig. 75.



After moulting this skin the animal acquires a pair of jaws and the fore and middle pair of foot-jaws; the body is much larger and the front part is greatly enlarged and protected by the shield-like head-thorax, which is now distinct and rounded in form. As the number of feet have become more numerous, they are smaller than before, and the anatomy of the internal organs is more complex. At the end of the body, now much elongated, is a pair of short feet, ending in several bristles. This is the Zoëa stage (Fig. 74, enlarged forty-five diameters) and corresponds to the Zoëa of the Crab, *Carcinas mœnas* (Fig. 75; *a*, natural size), discovered by Thompson.

THE CANADIAN ENTOMOLOGIST completed its first volume in July. The Editor, Rev. C. J. S. Bethune, Credit, Canada, announces that the publication will be continued and the number of pages of each number be increased from eight to at least twelve, and, if sufficiently encouraged, to sixteen, while the annual subscription will be increased from 50 cents to $1.00. We hope this journal will be sustained, for it is a credit to Canadian entomology.

THE AMERICAN ENTOMOLOGIST.—The August number, which comes to us in an attractive cover, is the last of Vol. i. The Editors announce that hereafter each number will consist of thirty-two pages instead of twenty-four, and the annual subscription has been raised from $1.00 to $2.00. The present number abounds with illustrations, while the paper is improved in quality. The magazine cannot fail to satisfy those who wish for information regarding our noxious and beneficial insects.

PROCEEDINGS OF SCIENTIFIC SOCIETIES.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.—The Eighteenth Annual Meeting of the Association was held August 18-25, at Salem, Mass. From the great number of papers presented, their high scientific character, and the large number of members present, the meeting was judged by many to have been, both in a scientific and social point of view, the most brilliant and successful one that has been held for many years. About two hundred and seventy-five members were present and one hundred and sixty-three papers were presented. A great deal of business was dispatched, and the legitimate objects of the Association so closely adhered to that invitations from various societies in Boston and Cambridge, the city authorities of Boston, and other places, were reluctantly refused in order that each paper should have a hearing. One day (Saturday) was given up to the enjoyment of a steamboat excursion about Massachusetts Bay, given by the city of Salem.

This meeting was signalized by the formation of two new subsections of Section B, viz.: *Archæology* and *Ethnology*; and *Microscopy*.

There was also held during the session a microscopic convention which proved very successful and interesting to microscopists, and as the standard of instruments made in the United States is not surpassed by those